From Stove-pipe to Network Centric Leveraging Technology to Present a Unified View

Medhat A. Abuhantash

U.S. Army, Communications and Electronics Command (CECOM),
Software Engineering Center (SEC),
Battlespace Systems Support Directorate (BSSD),
Intelligence Fusion Systems (IFS) Division
Fort Huachuca, AZ
Medhat.Abuhantash@us.army.mil

Matthew V. Shoultz

L3 Communications, ILEX Systems Sierra Vista, AZ Matt.Shoultz@ilex.com

Abstract

In today's Command and Control (C2) environment critical information is located in many disparate data sources. C2 decision-making can be adversely affected by insufficient or unavailable access to information located in these disparate data sources. This paper will provide an overview of the problems surrounding this issue, a real-world scenario representing the problem, and how the problem was overcome using a network centric approach. The paper will also demonstrate how the application of current technology can be leveraged to present a unified view of data from disparate data sources, and how our organization is leveraging technology to help the Warfighter eliminate the stove-piping of information to increase network centricity. The objective of this paper is to present the reader with insight on how to utilize today's technology to allow leaders to make well-informed decisions, thus increasing their effectiveness in fighting the Global War on Terrorism (GWOT). By understanding our use of technology in support of the Warfighter, the reader will gain key insights on how to improve their own organization's capabilities to support C2 decision-making.

1.0 Introduction

In a recent article in National Defense magazine, Lawrence P. Farrell Jr. stated:

... new agencies—as well as existing ones with new missions—tend to stove-pipe their activities, especially with respect to information. It is important to counter this tendency and to promote collaborative sharing of information.

(*Farell*, 2002)

The introduction of technology to the battlefield has been both boom and bust. For the Army, the transition from intelligence spot reports called in over the command net to an automated intelligence feed—directly from intelligence collectors and sensors to the intelligence analyst—has led to significant advances in situational awareness. One major challenge that the Army still faces is the stove-piping of information. With stove-piping, information travels up and down in an organization, with little sharing horizontally

Public reporting burden for the col maintaining the data needed, and c including suggestions for reducing VA 22202-4302. Respondents shot does not display a currently valid C	ompleting and reviewing the collec this burden, to Washington Headquald be aware that notwithstanding a	tion of information. Send comment parters Services, Directorate for Inf	s regarding this burden estimate ormation Operations and Reports	or any other aspect of the s, 1215 Jefferson Davis	his collection of information, Highway, Suite 1204, Arlington
1. REPORT DATE JUN 2004		2. REPORT TYPE		3. DATES COVE 00-00-2004	ered 4 to 00-00-2004
4. TITLE AND SUBTITLE				5a. CONTRACT	NUMBER
From Stove-pipe to Unified View	Network Centric I	Leveraging Technol	logy to Present a	5b. GRANT NUM	MBER
Office view				5c. PROGRAM E	ELEMENT NUMBER
6. AUTHOR(S)				5d. PROJECT NU	UMBER
				5e. TASK NUME	BER
				5f. WORK UNIT	NUMBER
7. PERFORMING ORGANI Army Communicat Engineering Center Huachuca, AZ, 8561	tions and Electronic r,Intelligence Fusio	cs Command (CEC	* * *	8. PERFORMING REPORT NUMB	G ORGANIZATION ER
9. SPONSORING/MONITO	RING AGENCY NAME(S)	AND ADDRESS(ES)		10. SPONSOR/M	IONITOR'S ACRONYM(S)
				11. SPONSOR/M NUMBER(S)	IONITOR'S REPORT
12. DISTRIBUTION/AVAIL Approved for publ		ion unlimited			
13. SUPPLEMENTARY NO The original docum		images.			
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFIC	ATION OF:		17. LIMITATION OF	18. NUMBER	19a. NAME OF
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified	ABSTRACT	OF PAGES 22	RESPONSIBLE PERSON

Report Documentation Page

Form Approved OMB No. 0704-0188 between organizations. Many advances have been made in tactical information sharing; however, with each new mission there is a recurring tendency to stove-pipe information.

2.0 Background

The U.S. Army Communications-Electronics Command (CECOM) Software Engineering Center (SEC) Battlespace Systems Support Directorate (BSSD), Intelligence Fusion Systems (IFS) Division at Fort Huachuca, Arizona, is a recognized Department of Defense (DoD) leader in software development, maintenance, enhancement, integration, configuration management, test services, and field support for U.S. Army tactical systems. Our goal is to provide timely, reliable and maintainable software support services and products to the U.S. Army Military Intelligence, Terrain and Weather communities worldwide and to multiple Program Executive Office (PEO) and Program Manager (PM)'s in support of their systems' development, training and fieldings.

The IFS mission is to:

Provide life-cycle software products and services that enhance Army/Joint warfighting, management, and support capabilities, to ensure that America's warfighters continue to own the decisive edge from the battlespace through the sustaining base.

During Operation Iraqi Freedom (OIF), CECOM SEC had in excess of seventy engineers embedded with Army units in the Area of Operations (AO). These engineers provided direct and timely support to the Warfighter. The CECOM SEC engineers investigated, isolated, repaired, and reported software anomalies. They also assisted the Warfighter with rapidly adapting the intelligence architecture to meet new mission demands.

3.0 Scenario

Intelligence analysts operating in geographically distributed locations have a limited capability to interact and collaborate on intelligence products. Stovepiped intelligence dissemination systems limit access to intelligence products and provide a limited capability to search or browse databases and perform comparative analysis.

(Alberts, 1999, p. 114)

The All Source Analysis System-Light (ASAS-L) is a U.S Army automation solution for tracking tactical intelligence data. The ASAS-L consists of a robust set of tools that allow the intelligence analyst to track enemy units, equipment, facilities, individuals, events and organizations as well as the relationships among them. The system can receive data from multiple sources using various communications mediums: Tactical Local Area Networks (TACLAN), Wide Area Networks (WAN) and tactical radio communications. The intelligence information that is received is stored in various databases within the ASAS-L. One of these databases, called the Stability and Support Operations Integrated Database (SASOIDB), stores Stability and Support Operations (SASO) entity data such as information about Individuals, Events, and Organizations (IE&O) and their

relationships.

Prior to the commencement of combat operations in OIF U.S. Army V Corps intelligence personnel began to use the ASAS-L and the SASOIDB database to track enemy SASO data. As the operation progressed, the database continued to grow, and after the completion of major combat operations in Iraq the database became even more important as OIF switched in earnest to tracking SASO data within the country.

With the commencement of the SASO phase, and to some extent during the combat phase, the intelligence analysts were presented with a new challenge—how to track enemy detainees. They also quickly realized that they had a large and rapidly growing SASO database from which they could not easily share information to other units. The only person that could directly view or query information in the database was the analyst who was actually sitting behind the keyboard. Once again, as in previous operations, they were stove-piping information, which was unacceptable to the senior leadership. To remedy the problem a decision was made to create a web application that would provide access to the data utilizing a standard web browser.

CECOM SEC personnel were embedded with the unit to provide software support for the ASAS-L and other ASAS systems. Some of the CECOM SEC personnel had experience with creating web applications using Macromedia ColdFusion. ColdFusion is a scalable web application server that allows users to rapidly develop web-based products. It runs on a variety of platforms such as Windows, Linux, and Unix, and supports all of the major standards including Extensible Mark-up Language (XML), web services, Java, and Microsoft .NET, and is easily integrated into an existing infostructure. ColdFusion was selected as the weapon of choice to rapidly create a web-based interface to provide access to the SASO data on the ASAS-L giving the Warfighter a complete historical record on individuals and affiliations, providing timely, actionable, and vetted intelligence to the commander.

CECOM SEC engineers created an initial capability, using ColdFusion, to allow web users to view lists of each of the three main SASO entity types: IE&O, along with the ability to view most of the details about each selected entity type. The application also provided the capability to perform limited keyword searches against the SASO data, or view data within predefined geographical areas. To track detainee information the intelligence analysts added metadata to an existing subject field in the ASAS-L SASOIDB. The ColdFusion application could then query against this data to track detainees within the web interface.

The ColdFusion application resided on a separate server, which connected to the ASAS-L and retrieved SASO data at regularly defined intervals, and stored the data on the ColdFusion Server in what Macromedia calls a Collection. The use of Collections reduced the load on the ASAS-L while keeping the information displayed relevant for the web users.

As operations progressed in the theater, the same capability was implemented at the Combined Joint Task Force-7 (CJTF-7) headquarters. The C2 CJTF-7 gave a high

priority to the implementation and enhancement of the ColdFusion application to support the CJTF-7 mission. In addition to the ability to store textual data about SASO entity types, the ASAS-L can store multimedia data as well, i.e., images, audio files, Microsoft Word documents, etc., to which the Warfighter wanted access. In response to these new requirements our organization utilized its Rapid Application Development (RAD) Team to create an enhanced version of the ColdFusion application, in order to meet the Warfighter's needs.

4.0 Leveraging Technology

CECOM SEC solicited requirements from the theater commanders and intelligence personnel, and began the development of an enhanced ColdFusion application. This enhanced version was completed and delivered in a 30-day period, meeting a critical February 2004 deadline for CJTF-7. The enhanced ColdFusion Application included the following capabilities:

- Integrate display of relationships between IE&O
- Ability to view all details of a record
- Link to any multimedia data associated with an entity
- Display the source of the information for each entity
- Make query results exportable as a Microsoft Excel spreadsheet or Comma Delimited text
- Ability to track detained and detained/subsequently released individuals

The enhanced ColdFusion application also included the ability to track detainees within a separate database that was synchronized with the SASOIDB individual data on the ASAS-L. The application was optimized for low-bandwidth applications, by limiting the number of images on a page, and providing paged views of the lists of entity data and query results. Several predefined queries were created to quickly access information that analysts wished to view on a frequent basis. The enhanced application included the ability to view all SASO entity types in a common format, providing a consistent user-friendly interface.

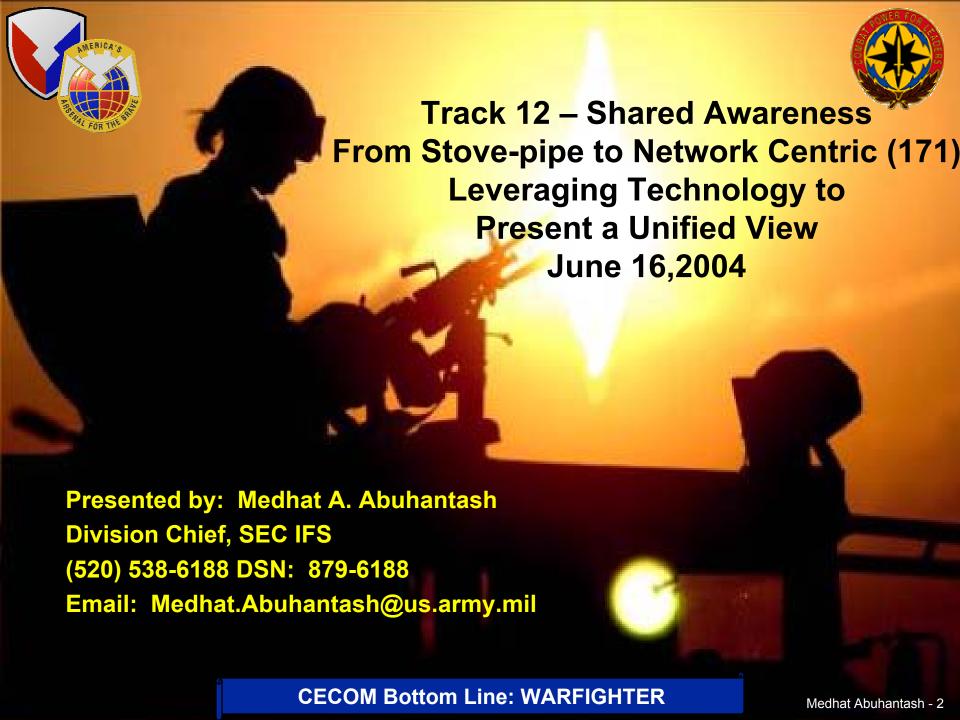
5.0 Conclusion

Much of the success in tracking SASO entities within the OIF AO can be attributed to the successful application of technology to eliminate the stove-piping of information in theater. By creating a web-based application that meets the demands of the Warfighter, CECOM SEC has created a powerful tool to aid the commander in C2 decision-making, simplifying the process, and virtually eliminating the stove-piping of SASO information. The addition of the ColdFusion enhanced web interface to the intelligence architecture quickly and efficiently transformed SASO tracking in theater from a stove-piped, limited capability to a network centric enabler. The use of the enhanced ColdFusion application has significantly improved the situational awareness of the Warfighter in the continued fight of the Global War on Terrorism.

References

- Farrell Jr., L. P (2002, October). Information sharing key to homeland security. Retrieved Mar 21, 2004, from http://www.nationaldefensemagazine.org/article.cfm?Id=902
- 2. Alberts, D., J. Garstka, & F. Stein. (1999). Network centric warfare : developing and leveraging information superiority. 2nd ed.
 Washington, DC: DoD C4ISR Cooperative Research Program.

Intelligence Fusion Systems SEC IFS CECOM **CECOM Bottom Line: THE WARFIGHTER**





Agenda



- SEC Organization and Mission Overview
- Introduction on Stove-pipe
- Background
- Scenario
- Leveraging Technology
- Conclusion





CECOM SEC Organization





- Post Production Software Support
- Worldwide Field Software Engineering
- Engineering Support Services
- Technical Software Support to Intelligence Training **Systems**
- Training and Training Development

Ft. Monmouth, NJ

- Director: Ed Thomas
- **Business Focus:**
 - Software Engineering for Communications and Intelligence **Electronic Warfare Systems**





Warfighter Support Structure









Global



Regional Field Support Operations Center (Subject Matter Experts)



On-Site Support

THE WARFIGHTER









Introduction



In a Recent Article in National Defense Magazine, Lawrence P. Farrell Jr. Stated:

"... new agencies—as well as existing ones with new missions—tend to stove-pipe their activities, especially with respect to information. It is important to counter this tendency and to promote collaborative sharing of information."

(Farell, 2002)

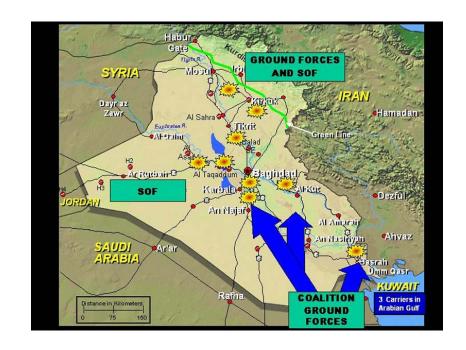




Background



- Engineers Embedded With Army Units
- Direct And Timely Support To The Warfighter
- Investigate, Isolate, Repair, And Report Software Anomalies
- Rapidly Adapt The Intelligence Architecture







Scenario



"Intelligence analysts operating in geographically distributed locations have a limited capability to interact and collaborate on intelligence products. Stove-piped intelligence dissemination systems limit access to intelligence products and provide a limited capability to search or browse databases and perform comparative analysis."

(Alberts, 1999, p. 114)





Scenario



- How to Track Detainees
- Large SASO Database
- Could Not Easily Share Information
- Stove-Piping Information
- Web Application Needed











- ColdFusion™
- Rapid Application Development



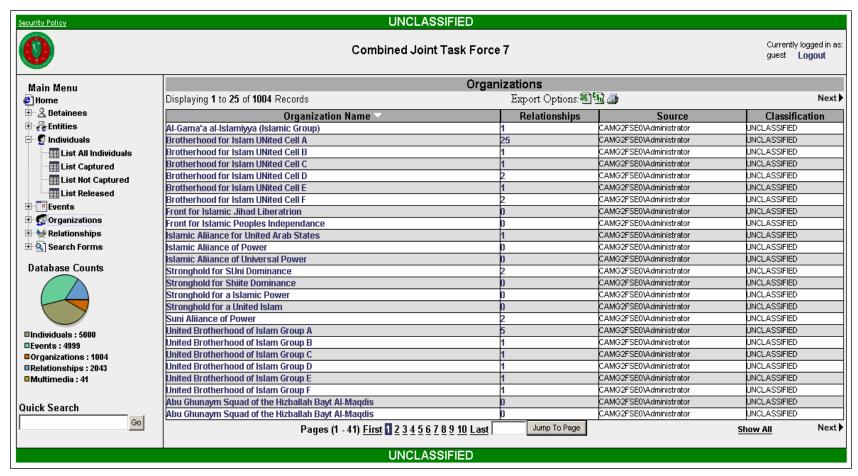






ColdFusion/Detainee Database Enhancements to All Source
Analysis System – Light (ASAS-Light)

Relationship Tracking



*Notional Data







ColdFusion/Detainee Database Enhancements to All Source
Analysis System – Light (ASAS-Light)

SASO Entity Tracking



*Notional Data

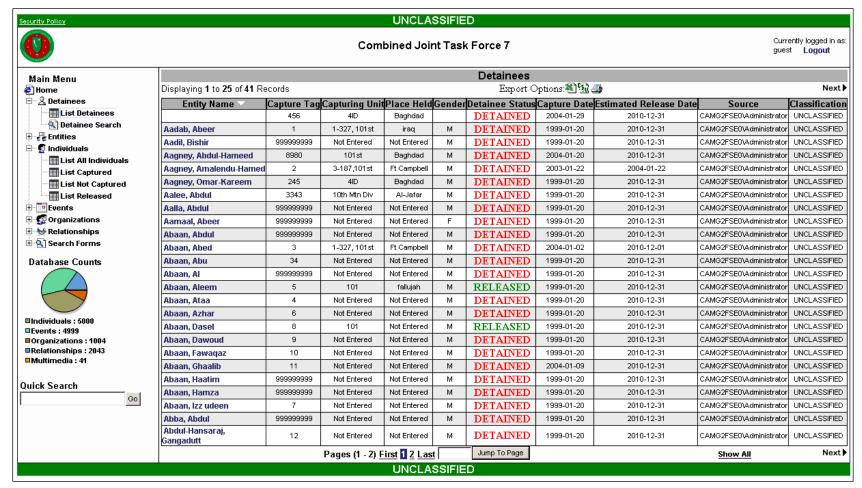






ColdFusion/Detainee Database Enhancements to All Source
Analysis System – Light (ASAS-Light)

Detainee Database



*Notional Data





Conclusion



- Successful Application Of Technology To Eliminate The Stove-piping Of Information
- Powerful Tool for C2 Decision Making
- Improved Situational Awareness







QUESTIONS?



CECOM Bottom Line: THE WARFIGHTER



Backup Material







All Source Analysis System



ColdFusion/Detainee Database Enhancements

personnel deployed to Southwest Asia (SWA) are currently employing a capability developed in Macromedia ColdFusionTM to display Stability and Support Operations (SASO) information stored in the ASAS-L database in a standard web browser. This capability was initially developed by U.S. Army Communications-Electronics Command (CECOM), Software Engineering Center (SEC), Intelligence Fusion Systems (IFS) Field Software Engineers (FSE), and further refined by the CECOM SEC IFS Rapid Application Development (RAD) Team based upon requirements provided by Intelligence Office(r) (G-2) and ColdFusion/Detainee Database Enhancements to All Source Analysis System-Light (ASAS-L) United States Intelligence personnel within the Area of Operations (AO).



query results, or search results can be spreadsheet, comma separated list, or local system as a Microsoft Excel TM ex ported and saved on the user's Export Capability: Entitylists, in a printer-friendly text format

relationship types between each of the tracked entity types: IE&O within the (IE&O) entity types within the SASO Database on the ASAS-L. All displays Relationship Tracking: The ENHs consistent, comprehensive view of Individuals, Events, and Organizations provide a list of relationships and SASO Database on the ASAS-L of information for a particular entity include links to associated entities, multimedia, and relationships.

Other Capabilities:

against all entity types using forms and Administrator, and Detainee Admin Advanced Search - Detailed search Quick Search - Keyword Search Role Based Permissions - Guest (KWS) against all entity types. roles to limit site permissions. Boolean logic.

files associated with a particular entity. Multimedia - Display of multimedia Images, Video, Audio, Documents,

detainee information, and site look and Entity Counts - Pie chart that indicates the number and type of entities in the manage temporary multimedia cache, user account requests, user accounts, Administrative Interface - Tools to ASAS-L SASO Database, with a corresponding legend and count.

Low Bandwidth - Design optimized for results lists, and limited use of images low bandwidth connections, paged

hoofs folia				UNCLASSFIED	SPFE	٥				2
•			Com	Combined Joint Task Force 7	#Tas	Force 7			org.	Garenty taged mail
Wate Mere						Detainess	ı			-
(E) Horse	Displaying 1 to 25 of 45 Fecands	ecards.				Esport	Report Opposer 2012			Neell
S. S. Between	Entiry Monte	Coptain Tay	Capturing Underlace Hels		Gerster	Detainer Status	Capture Date	Service Detainer Scoud Carter Date stimated Rologo Date	tel Source	Ossettceton
III List Detainess		958	Q#	Dogwood		DITAINED	2084-01-29	2010/12-31	CAROCYSSOACHMINISTER URD, ASSAUSS	UNCASSING
B. Detained Source	Auchab, Abour		1-327,1814	200	I	DITAINED	9080-08-30	2010-12-31	CARCIFISOAdministrator UACLASSINS	UNCLASSING
C. C	Aut. Behr	000000000	Not Entered	Net Drinned	I	DELAIMED	999-05-30	2010-12-31	CARGOTSBOAdmintrator	UNDLASSING
4	August, Atchialatered	9080	1812	Degrave	I	DELAIMED	3084-05-30	2010-12-31	CARGOTSEOMORIESINO	UNDLASSING
Mile Control	Asgrey, Amalenda Horsed	4	3-100,0014	Picanabal	I	DETAINED	2063-01-22	2004-01-22	CAMDISSIONAMISSIND UND ASSISTED	UNDACORDO
TELES Net Captured	Asgrey, Orser Aareen	345	99	Engrana	ı	DETAINED	1089-01-30	2010/12/21	CARRODISEONARISED BY LARLACOFED	UNICASSING
III List Paleased	Ashon, Abriel	2343	SOUND DA	MALLA		DETAINED	1989 OF 100 SEC.	3010.13.31	CARROS SEGMENTARIO LIACLASCINIO	UNICASSING.
S Streets	Astla, Abbid	600606066	NAT BY BOOK &	Md Breed		DHIAINED	00107666	200012-31	CARDOPSOA-MINISTRAN UAS, ASSERTS	UNICASSIMIS
S Coperiories	Agendal, Albert	000000000	Not Endored	Met Drings		DETAINED	1089-01-20	2010-12-31	CARDOP SEGMENTANO UNDUA SOPRE	UNICASSING
III he Ballationships	Absent, Abdul	000000000	Not Enforced	Net Drinned	I	DISTAINIED	999-01-30	2010-12-31	CARDOTODARMANNO UNDASSTED	UNGLASSING
A S. Beach lorns	Abson, Abed		4-307, 4814	Picenebel	1	DBTAINED	204-01-02	2010-12-81	CARCOTODACAMERICADO	UNDLASSINGS
Database Courts	Attent, Abs	*	Hox Entered	Not Ertered	I	DETAINED	999-01-30	2010-12-31	CARGOTSBOAchinistrador	UNDLASSINED
	Maxim, All	980808088	Nox Entered	Hat Drawed	ı	DETAINED	1089-01-30	2010-12-21	CARGOSEOWARRENSON	UNDLASSINDS
1	Alxon, Aleen		101	140,446	E	RELEASED	1089-OH-30	2010/12/31	CARGOSTONAMISMA	UNCAGORGO
	Alkson, 8000	+	Nat Erbands	Mad Simoned	I	DETAINED	1989/01/30	2010/12/21	CARDOS SOCIADAS EN LACLACORSO	UNITARISTICS CO.
)	Abson, Achor		Nat Breesed	Mat Briefed		DETAINED	DE UDISSIA	2010/12:31	CARDOTORANISMA URCASSINO	UNCASSING
District Later	Abson, Denid		non.	Md breed	1	RELEASED	021076861	3010.13.33	CARDOTOROANNINGO UNOLASSING	UNICASSING.
DOUBLE STREET 1 1801	Abson, Demond		Not Enforce	Net Drinned	1	DRIAMED	99900-30	2010-12-31	CARDITIONAL UNICASSING	UNCASSTED
Elliptedemontages : 2043	Abaun, Fewnqur	06	Not Enforced	Not Drined	1	DETAINED	9080-00-00	2010-12-31	CARDOTS SOM chinesto stor	UNCASSTED
Distriction 140	Atrant, Gradib	#	Hot Entered	Net Brisned	I	DEIAIMED	3084-05-09	2010-12-31	CARCITISOMORPHISMO	UNULASSINED
Section Section 1	About, Hastin	000000000	Hot Entered	Net Drines	I	DETAINED	1989-01-30	2010-12-21	CANDOTSEOAchinistrator	UNDLASSINGS
United Specific	Abson, Hanca	900000000	Not Entered	Not Drive ad	H	DETAINED	1009-01-30	3010-13-31	CARGOSEOWORKSHOO	UNDACORDO
8	Alkades, It's selects	1	Not Grossed	Not Growed	ĸ	DETAINED	1989-On-30	300013-31	CANDOSTONAMISMO	UNIXABBRED.
	Miles, Abdul	seminor	Not linkered	Nationed	н	DETAINED	1989-01.30	2010/12/21	CAREGISEONAMISTRAL DECLARISED	UNCACORSO
	Abdul Hannery, Gergadoti	-13	Not Entered	Net Drinned	1	DETAINED	999-01-30	2010-12-31	CHROZISONAHIEREN UNDASSIED	ONOVERNED
			Pages (1 - 2) Flor [1 2 Last	Flor 0 2 Loss	L	June Ta Phope			Stowas	Nesth
				UNCLASSIFIED	SSIFIE	0				
					١					

*Notional Data

contains additional information about an individual that has been detained or released such as: Detainee Database is a Microsoft SQL ServerTM database that is resident on the ASAS-L, and Detainee Database: Incorporated with the addition of the ColdFusion ENHs is the ability to track individuals that have been detained, or detained and then subsequently released. The Capture Tag, Date of Capture, Expected Release Date, Capturing Unit, and Place Held

Gov ernment Point of Contact (POC): CECOM Software Engineering Center (SEC) DSN: 879-6388 COM: (520) 538-6388 https://cecomifs-www.hua.army.mil Intelligence Fusion Systems (IFS) Updated: 032204